Blind Pointing Model Development - Results of DSS-13 Measurements on DOY 199, 2001

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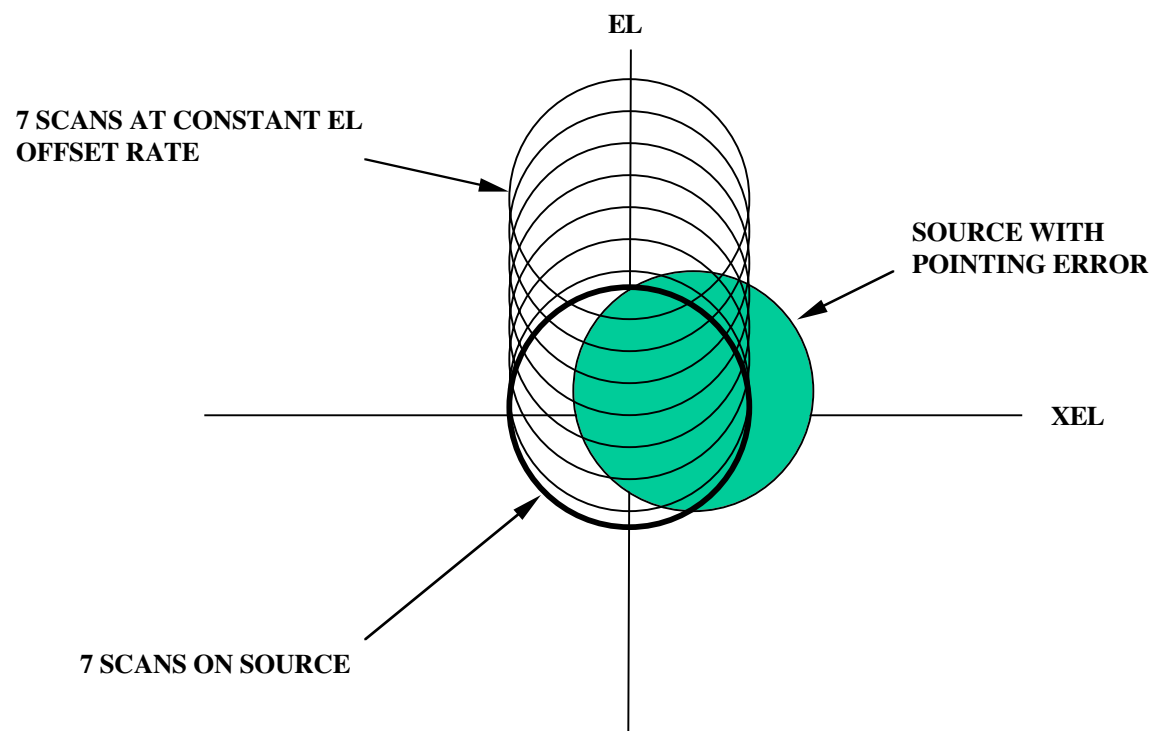# W-band Study - Pointing Issues

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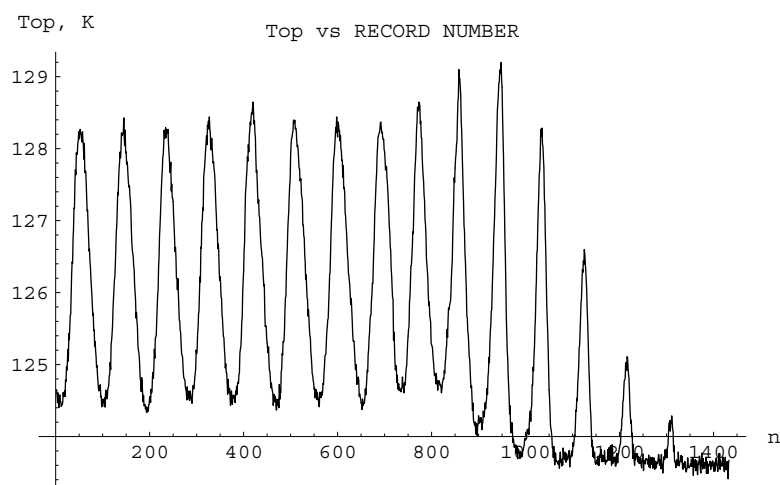# Open-loop CONSCAN Geometry

EL

7 SCANS AT CONSTANT EL OFFSET RATE

SOURCE WITH POINTING ERROR

XEL

7 SCANS ON SOURCE
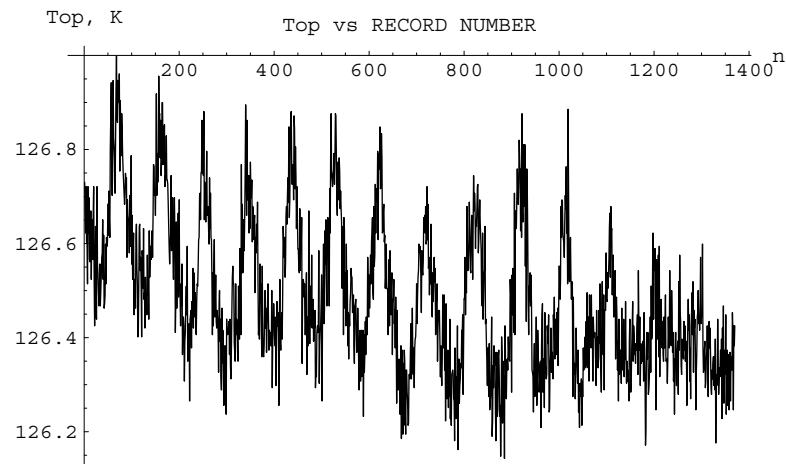
W-band Study - Pointing Issues

Typical CONSCAN T_{op} Plots, Ku-band Receiver

STRONG SOURCE

WEAK SOURCE

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Results of DOY 199, 2001 Pointing Measurements

SOURCE	UTC-hrs	AZ-deg	EL-deg	Top-K	XELAMPL-mdeg	ELAMPL-mdeg	XEL/EL	ELLIPTICITY
1829+487	0.818	48.232	28.131	126.680	22.077	20.281	1.089	1.046
1743-038	0.950	103.371	11.838	134.655	22.031	20.120	1.095	1.081
1331+305	1.083	124.945	82.105	123.251	19.478	20.202	0.964	0.890
1230+123	1.217	203.255	65.490	123.796	21.615	20.353	1.062	0.954
3C218	1.350	241.745	16.300	130.799	21.829	20.305	1.075	1.206
0542+498	1.483	323.538	12.326	139.329	22.361	20.316	1.101	1.309
1058+015	1.617	235.656	40.714	124.672	21.496	20.302	1.059	0.933
0927+390	1.750	294.373	40.188	124.552	22.112	20.189	1.095	1.200
1230+123	1.883	222.751	60.998	122.909	21.589	20.221	1.068	0.980
1130-148	2.017	221.516	28.947	125.987	21.691	20.215	1.073	1.008
1310+323	2.150	259.561	78.143	122.732	21.048	20.676	1.018	0.765
1256-057	2.283	207.847	45.086	124.232	22.016	20.226	1.089	1.052
1058+015	2.417	246.157	32.134	124.984	21.837	20.295	1.076	1.135
1411+522	2.552	350.371	72.685	122.263	19.951	20.202	0.988	0.770
0834+555	2.683	320.169	28.077	126.006	22.204	20.289	1.094	0.904
1058+015	2.817	250.671	27.572	126.302	21.804	20.163	1.081	1.191
1331+305	2.950	260.441	72.015	122.283	21.718	21.020	1.033	1.063
1733-130	3.217	138.334	30.958	125.655	23.788	20.114	1.183	1.151
1642+398	3.350	68.445	72.503	123.315	21.582	20.577	1.049	1.046
1927+739	3.483	18.790	41.735	125.320	21.741	20.019	1.086	1.043
2025+337	3.617	68.584	31.392	126.780	22.026	20.566	1.071	1.201
1833-210	3.750	137.238	20.527	129.839	24.336	19.976	1.218	1.104
2203+317	3.883	61.624	15.301	133.138	22.888	20.396	1.122	1.152
1833-210	4.017	140.525	22.686	129.486	24.058	20.146	1.194	1.058
2203+317	4.150	63.486	18.200	131.833	22.782	20.341	1.120	1.037
2136+006	4.417	96.018	9.697	138.736	23.791	20.241	1.175	1.243
2202+422	4.550	55.829	27.396	128.800	22.851	20.379	1.121	1.137
1411+522	4.686	314.624	58.991	125.492	21.644	20.843	1.038	1.096
1927+739	4.817	15.104	46.567	126.093	22.793	20.108	1.134	0.869
1411+522	4.950	313.335	56.656	125.411	21.937	20.710	1.059	1.048
2202+422	5.086	58.407	32.922	127.515	22.702	20.252	1.121	1.273
1642+398	5.883	293.831	75.889	125.467	21.455	20.165	1.064	1.207
1829+487	6.017	20.689	75.275	125.431	19.505	20.588	0.947	0.901
2148+069	6.150	105.432	31.980	128.461	24.131	20.479	1.178	1.178
1924-292	6.283	163.247	23.415	129.766	22.899	20.159	1.136	0.981
2148+069	6.417	108.378	35.109	128.046	23.143	20.477	1.130	1.043
1924-292	6.550	166.960	24.256	129.920	22.631	20.043	1.129	1.062
2202+422	6.686	63.958	50.157	126.258	21.799	20.426	1.067	1.083
2136+006	6.817	121.519	37.473	127.532	24.251	20.342	1.192	1.221
DR21	6.950	62.818	68.473	125.964	21.550	20.216	1.066	1.050

W-band Study - Pointing Issues

Results of DOY 199, 2001 Pointing Measurements - cont.

XELERR-mdeg	ELERR-mdeg	STDERR-mdeg	STDERR-mdeg	TPK-K	STDERR-K	HPBW-mdeg	STDERR-mdeg	STDDEV-K
4.001	0.619	0.520	0.814	0.601	0.019	43.103	1.792	0.073
-5.644	-6.708	0.387	0.473	0.958	0.022	44.115	1.181	0.088
2.831	-10.500	0.414	0.514	0.604	0.019	38.736	1.368	0.078
-9.800	-3.879	0.133	0.130	5.226	0.029	39.990	0.293	0.119
-4.586	17.345	0.782	2.756	0.831	0.040	50.476	3.738	0.072
21.015	91.482	8.718	57.533	1.790	1.103	154.830	54.807	0.099
-6.173	6.045	0.489	0.831	0.909	0.021	35.651	1.478	0.072
-0.449	15.370	0.249	1.262	1.775	0.044	43.649	1.721	0.074
-10.527	4.039	0.151	0.165	5.220	0.028	41.878	0.327	0.106
-9.124	12.014	1.207	1.903	0.566	0.025	43.421	3.066	0.073
-3.915	0.449	0.998	1.192	0.273	0.021	29.142	2.577	0.073
-10.122	4.942	0.184	0.238	3.901	0.025	42.371	0.441	0.094
-6.206	15.666	0.720	2.031	0.975	0.037	45.372	2.791	0.072
18.687	15.415	5.735	5.854	0.379	0.090	42.565	7.992	0.070
10.409	12.934	2.692	5.278	0.342	0.041	36.453	7.376	0.080
-4.345	13.054	0.593	1.580	0.882	0.028	41.919	2.528	0.085
-15.987	13.670	1.667	2.278	0.760	0.038	51.985	3.405	0.081
-10.886	-4.683	0.487	0.484	0.910	0.019	41.051	1.104	0.077
13.196	-3.464	0.301	0.236	1.914	0.022	39.831	0.566	0.096
15.137	2.571	1.016	0.941	0.632	0.018	41.641	1.892	0.072
12.052	-4.133	1.218	1.071	0.353	0.019	40.375	2.620	0.078
-8.024	-3.644	0.322	0.355	1.553	0.027	41.406	0.857	0.098
-1.027	-3.003	0.530	0.784	0.550	0.021	42.750	1.993	0.075
-15.030	3.964	0.614	0.510	1.595	0.026	42.351	0.964	0.085
5.176	-3.740	0.459	0.623	0.618	0.021	39.268	1.560	0.074
-4.972	-10.071	0.338	0.399	1.281	0.028	44.205	1.057	0.110
7.795	-1.147	0.662	0.768	0.504	0.019	39.689	1.873	0.068
3.533	12.388	1.433	4.363	0.306	0.027	41.939	6.781	0.070
16.303	0.835	1.417	0.919	0.603	0.025	37.479	1.852	0.074
7.498	30.939	2.708	10.399	0.540	0.113	60.044	11.428	0.072
8.160	-5.357	0.801	1.011	0.408	0.019	45.295	2.509	0.071
0.459	15.366	0.242	0.800	2.030	0.030	47.177	1.234	0.078
32.922	20.290	8.813	5.732	0.638	0.248	55.507	8.312	0.071
-7.573	-9.047	0.321	0.352	1.736	0.031	43.670	0.895	0.122
-11.260	-4.497	0.289	0.258	2.711	0.025	43.537	0.559	0.102
-10.061	-11.677	0.337	0.300	1.702	0.028	41.603	0.775	0.120
-9.727	-4.043	0.246	0.245	2.632	0.028	40.006	0.575	0.113
12.704	-7.375	1.047	0.894	0.408	0.017	41.392	2.147	0.076
-4.065	-7.469	0.323	0.407	1.270	0.028	43.062	1.071	0.107
14.044	-4.972	0.259	0.210	3.237	0.030	40.870	0.487	0.133

W-band Study - Pointing Issues

Isolating the Feed Position Errors

- By selecting a specific trajectory in the AZ, EL plane, we may set $\phi + AZ - EL = \theta_i$ so that
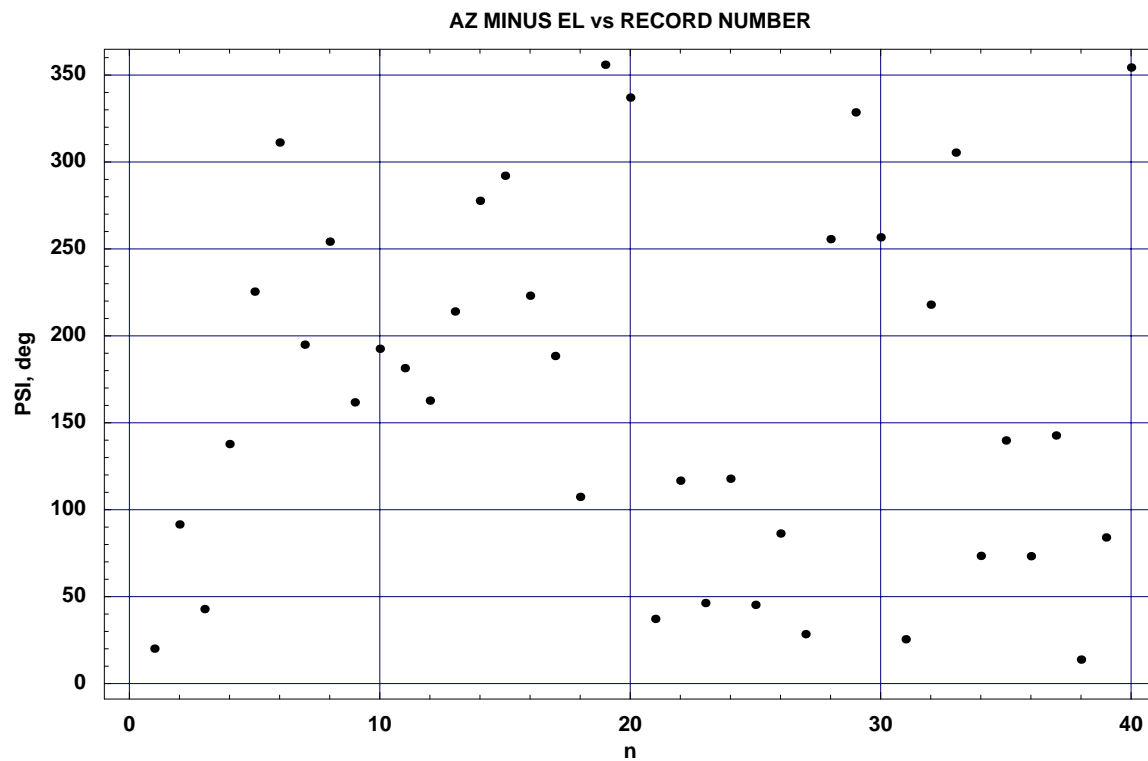
$$R\Delta\phi/f|_i \cong \langle\Delta EL'\rangle\cos\theta_i - \langle\Delta XEL'\rangle\sin\theta_i$$
$$\Delta R/f|_i \cong \langle\Delta EL'\rangle\sin\theta_i + \langle\Delta XEL'\rangle\cos\theta_i$$

W-band Study - Pointing Issues
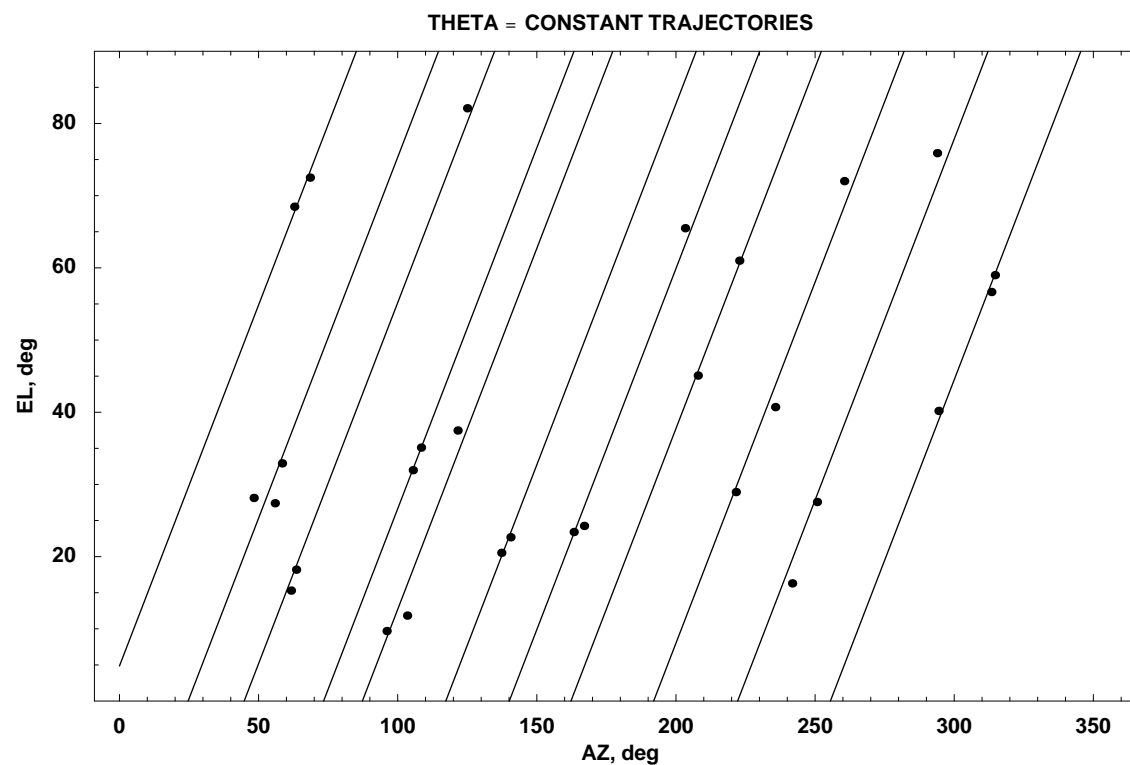
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AZ minus EL for DOY 199, 2001, Pointing Measurements

AZ MINUS EL vs RECORD NUMBER

W-band Study - Pointing Issues

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Trajectories for DOY 199, 2001, Pointing Measurements

THETA = CONSTANT TRAJECTORIES

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Ku-band Feed Position Errors Derived from DOY 199, 2001, Pointing Measurements

$$R\Delta\phi/f = 8.0 \pm 2.9 \text{ mdeg}$$
$$\Delta R/f = -7.6 \pm 3.7 \text{ mdeg}$$

THE RELATIVELY LARGE ERRORS IN THESE RESULTS STEM FROM THE LARGE POINTING AND FEED OFFSET ERRORS. A SECOND ITERATION USING A CORRECTED FEED POSITION AND A NEW, 4TH ORDER POINTING MODEL SHOULD RESULT IN A MUCH IMPROVED FEED ERROR PREDICTION AND POINTING ERROR MODEL.